Applications of Big Data Analysis and Artificial Intelligence to Advanced Process Control and Decision Support Systems

MOST 科技部 Ministry of Science and Technology

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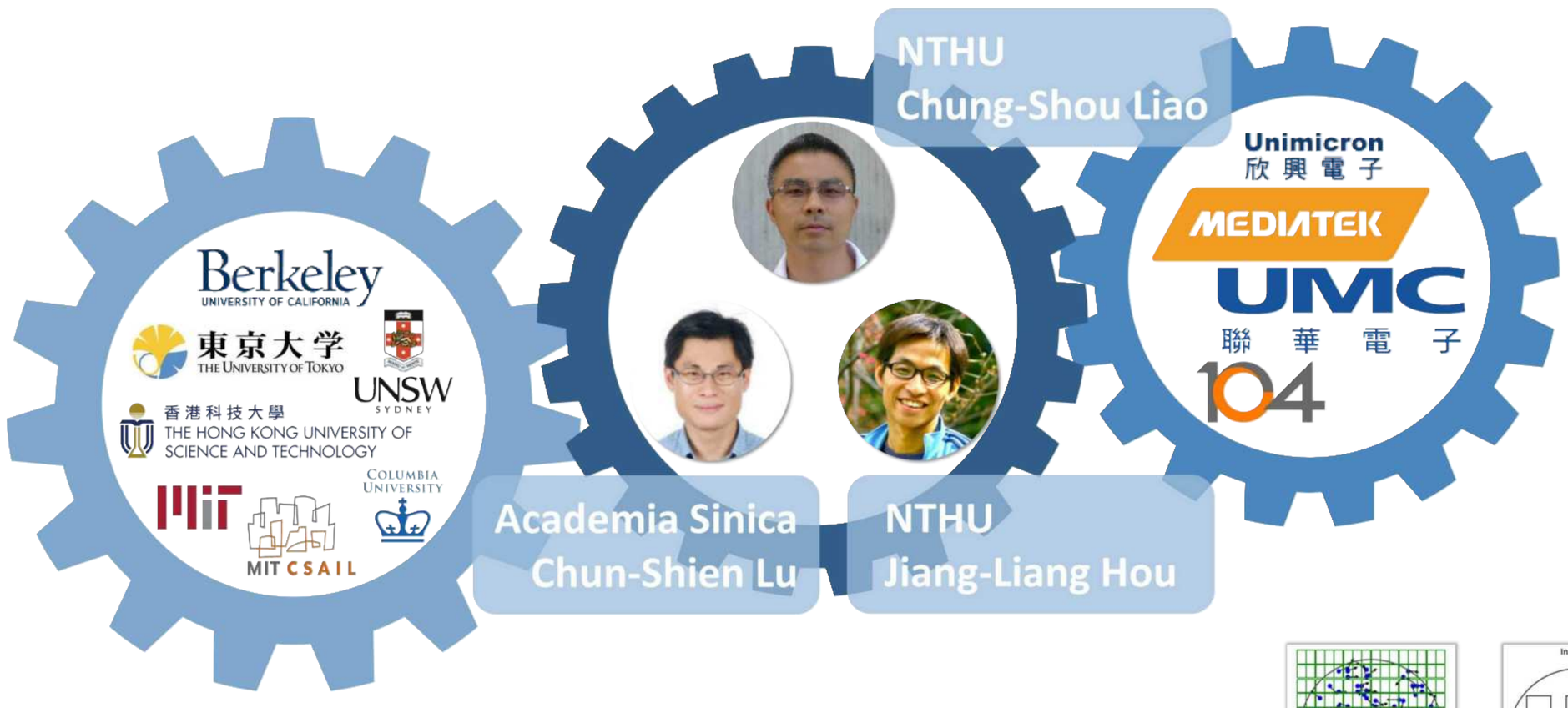
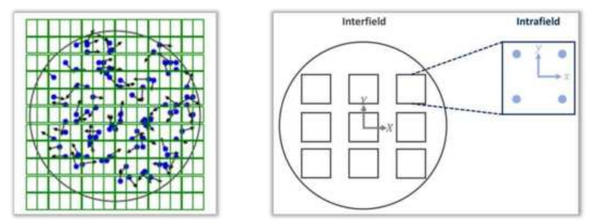
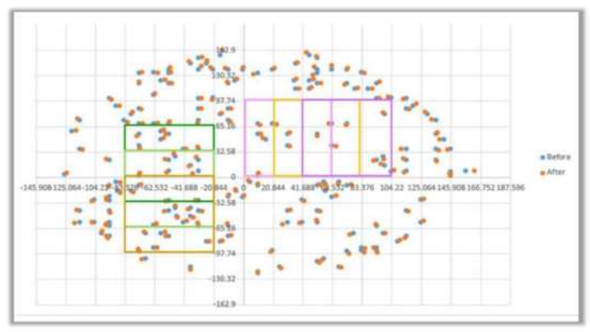
- The short-term goal: Improve lithography process in semiconductor industry; attempt to make use of real data visualization; identify the associated clusters from big data and conduct automatic compensation through deep learning approaches.
- The mid-term goal: Develop compression techniques for deep neural network learning models; based on the concept of collective intelligence, study and build knowledge cases through multi-channel sources.
- The long-term goal: Establish a systems platform for knowledge management and decision support; construct an advanced process control and decision making system.





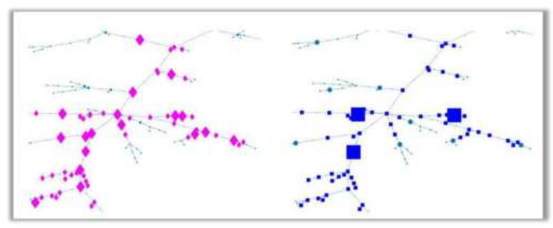
2019 Development of core technology

Exploit data visualization for overlay error prediction in wafer bin maps. Design clustering techniques for the lithography process, identify the similarity recognition between the previous overlay data, and then establish machine learning models for further error prediction.



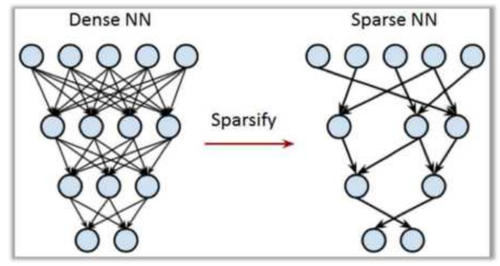
2020 Industry-university collaboration and applications

Develop new clustering algorithms using a new edge clustering coefficient for unsupervised learning models. Meanwhile, apply parameter optimization approaches to high-tech semiconductor manufacturing processes to enhance industry-university collaboration.



2021 Extension of core technology

Extend key techniques, including: designing sampling approaches for measuring lithography overlay errors, and devising compression algorithms for the speedup of deep learning models. Moreover, develop structured knowledge using collective intelligence, and conduct knowledge management from multi-channel sources.



2022 Knowledge management and decision support platform

Establish a structured knowledge management platform. Conduct the revised deep learning models with optimizing compression techniques. Furthermore, connect more industry-university collaborations based on the integration of core techniques and the platform.